



CITY OF KIRKLAND

Department of Public Works

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MEMORANDUM

To: City Council

From: Transportation Commission, Michelle Goerdel, Chair

Date: June 26, 2003

Subject: Recommendation on engineering improvements at uncontrolled crosswalks

Background

Last fall, you directed the Commission to begin work on determining appropriate engineering improvements at uncontrolled crosswalks. These are crosswalks which traverse streets where traffic is not required to stop, except when pedestrians are present. This memo outlines our recommendations on this subject. We will be considering the topics of pedestrian safety as it relates to education and enforcement later in 2003 in accordance with the Commission work plan that you approved.

We began our work last November with adoption of a work plan for the topic of pedestrian safety and a well attended meeting where citizens from different neighborhoods voiced their concerns about crosswalks throughout Kirkland. In December and January we spent portions of our regular meetings increasing our knowledge of crosswalk safety research, treatment methods and current practices in Kirkland and elsewhere. We suspended our crosswalk work in February to focus on preparing a recommendation for I-405, but resumed in March by preparing an initial set of recommendations for improvements. In early April we made a series of informal field checks to key crosswalks to get a feel for how they actually operate. On April 22, about 20 individuals attended an open house at City Hall to review our preliminary recommendations. The Open House gave Commissioners a chance to communicate one-on-one with citizens and better understand specific concerns. At our regular April meeting we asked staff to check on a few issues that came up at the Open House and to draft a recommendation to Council. That recommendation was finalized at our June 25th, 2003 meeting and is presented here.

The North Carolina Ranking System

The North Carolina Ranking System was used to shape the prioritization of crosswalk improvements. It is based on a recent study of crosswalks across the US (including Seattle and Portland) and it makes statistical links between crosswalk characteristics and accident experience. It turns out that traffic volume, speed limits and the number of travel lanes are the best predictors of pedestrian safety at a crosswalk. The system sorts crosswalks into 3 categories:

C = Candidate sites for marked crosswalks

P = Possible increase in pedestrian crash risk may occur if crosswalks are added without other pedestrian facility enhancements

N = Marked crosswalks alone are not recommended, since pedestrian crash risk may be increased with marked crosswalks. Consider using other treatments, such as traffic signals with pedestrian signals to improve crossing safety for pedestrians.

These designations will be referred to throughout our recommendation, but of particular focus are the N rated locations where no improvements (except in some cases Pedflags) are in place.

Process for arriving at suggested improvements

Because there is a need or desire for improvements at many crosswalks that, in total, potentially have a huge cost, one of the critical areas of our work was to identify a smaller group of crosswalks where improvements should be targeted first.

The Commission directed staff to use the two factors as primary for determining where additional improvements should first be installed. These were 1) ranking by the North Carolina system and 2) accident experience. Other factors including

- connections on the pedestrian network and connections to important locations
- use in general and by vulnerable populations like school aged children and senior citizens.
- reasonable spacing between crosswalks on arterials

were to be used as secondary considerations in deciding where improvements are located. Finally, public desire for particular improvements should be considered. This process and some of it's outcomes are shown in Figure 1. Note that the two major reasons a crosswalk is considered for improvements are 1) it has accident experience as demonstrated by 3 or more accidents in the past 10 years and one or more in the past 5 years or 2) the North Carolina ranking system suggests that improvements are important (i.e. an N ranking) and no improvements are in place. The Reasoning column of Tables 1 and 2 represent the "assess for options" box at the center of Figure 1. In addition, Tables 1 and 2 describe the proposal for each crosswalk in the group designated for improvements first. The Commission recognizes that Council may, from time to time wish to move other crosswalks into the group of those that are most important for improvement.

Crosswalk Removal

The removal of a crosswalk can be thought of as a type of treatment especially appropriate for N rated crosswalks that don't lend themselves to other types of improvements. Just as careful consideration should be given to locations where crosswalks are installed, removal should also be considered carefully. Therefore, eight factors were developed to assess the technical merit of removing a given crosswalk.

1. N rating based on NC rating system
2. Accident experience over the past 5 years This removal criteria assumes that a crosswalk with more accidents is a better candidate for removal.
3. Ped volume is small
4. Crosswalk removal will result in low or decreased pedestrian usage. (This criteria was found to be too difficult to measure to be effective in ranking crosswalks.)
5. Any associated bus stops are lightly used, or bus stops can be relocated.
6. It's "close" to a "better" crosswalk
7. Appropriate Improvements are not feasible
8. There's a feasible solution but it costs too much

After developing a scoring system for consistently measuring each of the attributes, each N rated crosswalk was examined and scored. There were 6 criteria since only N rated crosswalks were considered (criteria 1) and since criteria 4 was not used. Crosswalks that were better candidates for removal scored fewer points in each criteria. A total score was developed for each crosswalk and was used to develop the removal recommendations in Tables 1 through 3 above.

In addition to technical factors that describe the appropriateness of removing a given crosswalk, City Council has emphasized that a public process should also be undertaken before crosswalks are removed. This might consist of a mailing to all residents within close proximity to each crosswalk to be removed asking for comments followed by a meeting where the removal candidates are discussed and the reasons for the proposed removal are explained. It's expected that the City Council would want to approve removals and that they would want a recommendation from the Transportation Commission. Therefore, we propose the following process in advance of crosswalk removal:

1. Propose locations for removal based on criteria
2. Hold open house (one per location or one for all locations) and invite people to express their views on the removal. Provide technical information about each site
3. Transportation Commission decides on whether or not to recommend removal to the City Council
4. City Council makes final decision on removal.

Figure 1 Process for developing recommendation



TABLE 1 Locations with 3 or more accidents in past 10 years, and 1 or more accidents in the past 5 years, ranked in order of 10 year accident experience (number of accidents in 10 years shown in parenthesis.)

No.	Location	Existing Improvements (in addition to marked crosswalk)	Proposal	Reasoning
1-1	Central Way and 4th (6)	Island, overhead signing, flashing crosswalk	Remove after installation of signal at Park Place driveway. Install flashing advance stop bar in the interim.	Park Place driveway meets signal warrants. All basic improvements have been in place for some time and accident experience has not improved. Major connection and used by vulnerable pedestrians. Grant to install in-pavement flashers at an advanced stop bar has been secured from the Washington Traffic Safety Commission.
1-2	Central Way and 5th (4)	Island, overhead signing, flashing crosswalk	Remove after installation of signal at Park Place driveway.	
1-3	3rd/Park Place (Transit Center) (4)	Flashing crosswalk at one crosswalk, none at other	Improve with rebuild of 3rd after transit center is relocated	It is possible, but not likely that the transit center will remain at 3rd. If this happens, the crosswalks will be upgraded. If transit leaves, it is not yet clear what will happen to the extra width, now used by busses. Bump-outs or islands should be considered as part of any rebuild. Major sewer project is scheduled for 3rd in the next few years.
1-4	Lake/Park Lane (4)	None	Install bump-out on east side of crosswalk. This may require another bump out on the north side of Lake and Kirkland.	This design is supported by the Downtown Strategic Plan. Traffic operation consequences are relatively major at adjacent traffic signals.
1-5	NE 124th/105th (3)	Island	Flashing crosswalk and overhead signing are under construction	No action. Evaluate the effectiveness of devices under construction.
1-6	Central/Main (3)	None	Central/Main Wait for decision on narrowing of Central Way. Consider removal if narrowing fails.	Decision will be made in a year or so concerning the narrowing of Central Way in connection with a sewer project planned for the street. If Central Way is narrowed, this will move to a C rated crosswalk. If Central Way

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				is not narrowed, consider removal.
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Table 2 N rated locations with no improvements currently in place. Ranked in order of volume, lanes and speed limit.

No.	Location	Existing Improvements (in addition to marked crosswalk)	Proposal	Reasoning
2-1	4555 Lake Washington Boulevard	None	Install improvements such as flashing crosswalks and overhead signs.	It is not feasible to site an island at this crosswalk without limiting driveway access or moving the crosswalk a significant distance. Strong support for retaining crosswalk by neighbors at open house and at subsequent TC meetings. The elimination of this crosswalk increases the spacing between remaining crosswalks to approximately 2000' which is greater than desirable.
2-2	Market Street / 20th Ave.	None	Lower transformer box in median and relocate crosswalk to existing nearby island. Build bump-outs.	Nearby island is logical place for crosswalk, but existing transformer box could block view of pedestrians. If the transformer can not be lowered, consider removal of the crosswalk.
2-3	Market Street / 19th Ave.	None	Relocate south to north end of nearby island. Build bump-outs.	Nearby island is logical place for crosswalk.
2-4	Market Street / 13th Ave.	None.	Remove.	Not feasible to site island. Better crosswalks exist at 12th and 14th Avenues each of which is approximately 325' away.
2-5	Central Way and 1st	None	Wait for decision on narrowing of Central Way. Consider flashing crosswalk if narrowing is not pursued.	Decision will be made in a year or so concerning the narrowing of Central Way in connection with a sewer project planned for the street. If Central Way is narrowed, this will move to a C rated crosswalk. If Central Way is not narrowed, consider flashing crosswalk. Alternatively removal could be considered, but this is a core downtown connection.

No.	Location	Existing Improvements (in addition to marked crosswalk)	Proposal	Reasoning
2-6	124th Ave/NE 112th	None	Crosswalks are located on each side of this intersection. Remove one and install an island for the other after relocating it slightly.	Focuses crossings at one crosswalk with island.
2-7	98th Ave/Casa Juanita	None	Install island, relocate crosswalk.	Island can be sited with minor movement of crosswalk. High volume of peds and vulnerable senior population.
2-8	Central/Main	None	See No. 2-5 see also No. 1-6 in previous table.	See No. 2-5 see also No.1-6 in previous table.
2-9	124th Ave/107th Pl.	None	Remove with possible consolidation with 107th Street at new island to the north.	107th Street has no island, but is two lane section and therefore rates as C. 107th Pl crossing appears to have light usage. Decision when to remove and when to consolidate can take place during removal process.

Prioritization for improvements

Once the group of potential improvements were identified, the next step was to prioritize the locations where action should be taken first. As shown in Figure 1, we grouped action into three categories:

- Projects
- Removals
- Wait for related action or decision

Rather than suggest a strict priority for improvements however, it seemed more likely that action would be taken in the various areas simultaneously, and the best course would be to remain flexible about the order in which improvements are made. For example, if a small amount of funds are available that are adequate to install a lower priority improvement sooner than a more expensive higher priority project, the lower priority project should be installed first. Nonetheless, Table 3 presents a priority listing of projects in each of the different areas. The Reasoning column explains why the project was prioritized as it was.

Table 3 Priority ranking of crosswalks needing projects, removal or waiting for other projects or processes before action is taken

Projects		
Location	Action	Reasoning
1-1 and 1-2, Central and 4th/Central and 5th	Signal at Park Place driveway and Central Way, to allow removal of crosswalks at 4th and 5th.	Accident history, connections, vulnerable pedestrians and opportunity for funding from Park Place.
2-7 98th Ave/Casa Juanita	Relocate slightly, install island	Of the locations in Table 2, estimated to have highest pedestrian volume, most vulnerable population. Relatively simple project.
1-4 Lake Street/Park Lane	Install bump-out	Second highest accident experience where a project is prescribed. Construction of bump-out is supported by Downtown Strategic Plan, but is forecast to have relatively substantial impacts on auto traffic at adjacent signals. More implications than project 2-7.
2-3 Market /19th	Relocate south to north end of nearby island. Build bump-outs.	Market/19th and Market/20th have about the same exposure/volume etc., project at 19th is simpler.
2-2 Market/20th	Lower transformer box in median and relocate crosswalk to existing nearby island. Build bump-outs.	Project depends upon ability to change box configuration. If box cannot be altered, removal of the crosswalk may be necessary.
2-6 124th Ave/NE 112th	Crosswalks are located on each side of this intersection. Remove one and install an island for the other after relocating it slightly.	Lower volume on 124th Ave than on Market Street, therefore Market projects are ranked higher than 124th Ave projects. Project at 107th requires removal process before consolidation is considered and may be removal only
2-9 124th Ave/107th Pl.	Remove with possible consolidation with 107th Street at new island to the north.	New island and consolidation may be necessary. See also 2-9 below.
2-1 4555 Lake Washington Boulevard	Install improvements such as flashing crosswalks and overhead signs.	Public support for retaining rather than removing. Island is not feasible without either substantial relocation or restriction of driveway movements.

Removal		
Location	Action	Reasoning
2-4 Market St/13th Ave	Removal	Even an island cannot be feasibly sited at these locations that are rated "N" and have no improvements. Removal will not take place before a public process has been conducted.
2-9 124th Ave/107th Pl.		

Waiting for other process or projects		
Location	Action	Reasoning
1-3 3rd/Park Place Current transit center	Improve as a part of rebuild of 3rd during transit center relocation or during sewer project.	Each of these locations and the scope of their necessary project could be changed as a result of other projects or decisions that are to be made in the relative short term.
1-6 Central/Main	Wait for decision on narrowing of Central Way. Consider removal or flashing crosswalk if narrowing is not pursued.	
2-5 Central/1st		

New Locations

We recommend the following two statements be adopted regarding installation of new crosswalks.

- New crosswalks rated N or P will be installed only with appropriate improvements.
- New crosswalks will be installed at C rated locations only if they connect to a major facility such as a park, school, library, pedestrian route, etc.

This recommendation is intended to be relatively limiting in the placement of new crosswalks. We hope to direct staff to be very careful in the approval of new crosswalk locations particularly where a N or P ranked crossing is involved.

Principles

We developed the following principles to serve as guidelines for the work we've completed and for future work on crosswalks.

1. The North Carolina ranking system is valid. Therefore, all other things being equal, crosswalks are improved in the order: N then P then C. Within a particular category, crosswalks are ranked for improvement by traffic volume, then by number of lanes and then by speed limit. No ped crossings are placed on routes with vehicular volumes of greater than 30,000 without a signal.
2. Crosswalks that have any pedestrian accidents in the past 5 years and 3 or more accidents in the past 10 years are an accident problem and rate higher for removal or for improvement.
3. All other things being equal, crosswalks that make connections to routes on the pedestrian network as described in the Non-Motorized Plan should be considered for improvement first.
4. School crosswalks are only on accepted school walk routes. SN, SP and SC crosswalks are treated as non-school N, P and C crosswalks respectively. Favor improvements on school routes.
5. Improved Crosswalk spacing on arterials of 1200' or less is desirable and a general minimum is 400'.
6. Lighting at crosswalks should be analyzed and a plan for improvement should be developed independent of other improvements.
7. Basic improvements beyond lighting are applied in the order 1) islands 2) flashing crosswalks 3) overhead signs 4) signals (half, full, etc).
8. All N rated crosswalks should have at least an island. If an island is not feasible, the crosswalks should be seriously considered for removal. Only if removal is not feasible should improvements other than an island be considered first.
9. Removal is an option if technical and non-technical factors are met.
10. Warrants for Pedestrian signals are driven by gaps, not necessarily by the MUTCD volume warrants.